

Claim Amendments:

1 (currently amended). A hub apparatus for a millimeter wave wireless communication system, comprising:

a support member;

a fan beam antenna coupled to said support member that propagates electromagnetic energy in a fan pattern; and

a receive antenna mechanism coupled to said support member that receives a plurality of pencil beam transmissions from different customer premises equipment (CPEs) located in different physical locations within the range of the radiation pattern of said fan antenna; and

a supplemental pencil beam antenna coupled to said support member and separate from said receive antenna mechanism that is capable of transmitting electro-magnetic energy beyond the range of said fan antenna, such that at a given distance from said hub, the signal propagated from said supplemental pencil beam antenna has a greater signal strength than a signal propagated from said fan antenna.

2 (original). The apparatus of claim 1, wherein said fan beam antenna mechanism propagates an electro-magnetic radiation pattern that has an azimuth component that is greater than its elevation component.

3 (original). The apparatus of claim 1, wherein said fan antenna propagates millimeter wave electro-magnetic energy.

4 (original). The apparatus of claim 1, wherein said receive antenna mechanism includes a shared aperture antenna device.

5 (original). The apparatus of claim 4, wherein said shared aperture antenna device is a phased array antenna device.

6 (original). The apparatus of claim 4, wherein said shared aperture antenna device is a multi-beam antenna device and has a plurality of individual feeds provided therewith, each feed propagating a pencil beam transmission from a different physical location.

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7 (original). The apparatus of claim 4, wherein said shared aperture antenna device includes a Luneberg lens.

8 (original). The apparatus of claim 1, wherein said receive antenna mechanism is an array of pencil beam receive antennas.

9 (original). The apparatus of claim 1, wherein at least one of said fan beam antenna and said receive antenna mechanism is configured to function in 360 degrees in azimuth.

[Cancel claims 10-11.

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~~12~~ (currently amended). A hub apparatus for a millimeter wave wireless communication system, comprising:

a support member;

a transmission antenna coupled to said support member that propagates electromagnetic energy in a pattern that has an azimuth component that is larger than the elevation component; and

a receive antenna mechanism coupled to said support member that receives a plurality of pencil beam transmissions from different customer premises equipment (CPEs) located in different physical locations within the range of the radiation pattern of said transmission antenna; and

a supplemental pencil beam antenna coupled to said support member and separate from said receive antenna mechanism that is capable of transmitting electro-magnetic energy beyond the range of said fan antenna, such that at a given distance from said hub, the signal propagated from said supplemental pencil beam antenna

has a greater signal strength than a signal propagated from said fan antenna.

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~~13~~ (currently amended). A hub apparatus for a millimeter wave wireless communication system, comprising:

a support member;

A a hub-based transmit antenna coupled to said support member that propagates electromagnetic energy to a plurality of customer premises equipment (CPEs) within the range illuminated by said transmit antenna; and

a hub-based receive antenna mechanism coupled to said support member that receives a plurality of pencil beam transmissions from different CPEs located in different physical locations within the range of the transmit antenna, said receive antenna mechanism including a shared aperture antenna device;

wherein said receive antenna mechanism includes a plurality of receive signal processing channels that each have a first mixer for separation of a first set of IF signals, and wherein each of said mixers is coupled to a common LO signal generator.

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~~14~~ (original). The apparatus of claim ¹¹~~13~~, wherein said transmit antenna includes a shared aperture antenna device.

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~~15~~ (original). The apparatus of claim ¹²~~14~~, wherein the shared aperture transmit antenna device and the shared aperture receive antenna device utilize at least in part a common shared aperture device; and

said hub apparatus further includes circuitry for processing separate receive and transmit signals from and to, respectively, that common shared aperture device.

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~~16~~ (original). The apparatus of claim ¹²~~14~~, wherein said shared aperture transmit antenna device includes a phased array antenna device.

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~~17~~ (original). The apparatus of claim ¹²~~14~~, wherein said shared aperture transmit antenna device includes a multi-beam antenna device.

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~~18~~ (original). The apparatus of claim ¹¹~~13~~, wherein said transmit antenna includes a fan antenna device.

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~~19~~ (currently amended). A millimeter wave wireless communication system, comprising:

a hub support structure;

a hub-based transmit antenna coupled to said support structure for transmitting electro-magnetic energy;

a plurality of customer premises equipment (CPEs) capable of receiving electro-magnetic radiation from said hub-based antenna, and each CPE including a pencil beam antenna for transmitting electro-magnetic energy towards said hub support structure; and

a receive antenna mechanism coupled to said hub support structure that receives pencil beam electro-magnetic energy from each of said plurality of CPEs;

wherein said receive antenna mechanism includes a plurality of receive signal processing channels that each have a first mixer for separation of a first set of IF signals, and wherein each of said mixers is coupled to a common LO signal generator.

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~~20~~ (original). The system of claim ¹⁷~~19~~, wherein the pencil beam antenna of each CPE is used for transmit and receive.

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~~21~~ (original). The system of claim ¹⁸~~20~~, wherein said transmit antenna and said receive antenna mechanism are configured to propagate millimeter wave electro-magnetic energy.

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~~22~~ (original). The system of claim ¹⁷~~18~~, wherein said hub-based receive antenna mechanism includes a shared aperture antenna device.

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~~23~~ (original). The system of claim ¹⁷~~19~~, wherein said hub-based transmit antenna includes a shared aperture antenna device.

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~~24~~ (original). The system of claim ¹⁷~~19~~, wherein said hub-based receive antenna mechanism includes an array of pencil beam receive antennas.
